



**Installation & User's Manual  
*for the***

**Mo. 24V-25A**  
**High Frequency, Universal AC Input  
Battery Charger**

# Installation and User's Manual

*for the*

## Mo. 24V-25A

### High Frequency, Universal AC Input Battery Charger

#### **IMPORTANT: SAVE THESE INSTRUCTIONS!**

Read and follow all instructions before installing, operating, or servicing charger. Any deviation can cause serious and permanent damage. Installation and servicing must be performed by qualified personnel. Failure to follow the instructions voids the warranty of the charger.



The lightning flash with arrowhead symbol, within an equilateral triangle, is intended to alert the user to the presence of un-insulated “dangerous voltage” within the equipment’s enclosure: that may be of sufficient magnitude to constitute a risk of electric shock to persons.



The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the equipment.

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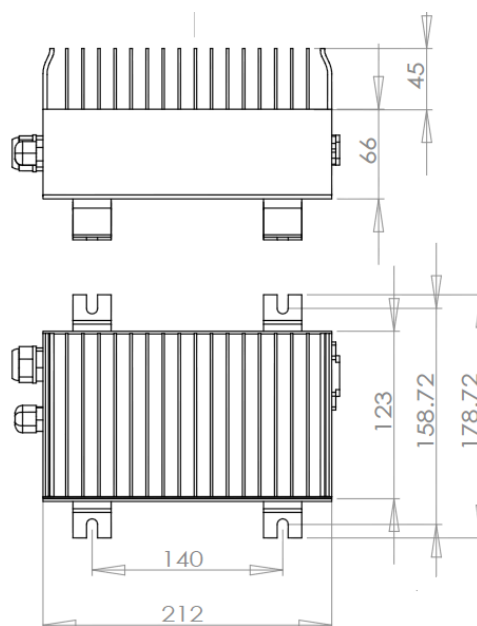
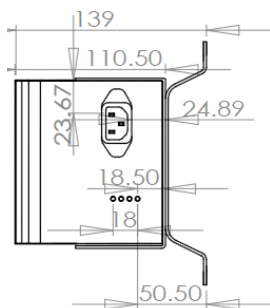
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## **Charger Features:**

- Advanced high frequency design.
  - High efficiency.
- 25 ADC charging current.
- Convection cooled with no moving parts.
- Advanced microprocessor control.
  - Precise charging and termination algorithms.
  - Flooded type batteries and sealed gel (AGM) batteries.
- Universal AC input.
  - 85-130/170-264 VAC, 47-63 Hz range.
  - Single model for worldwide use.
- Low battery voltage start.
- LED indicators.
- Charger protection.
  - Voltage mismatch
  - Reverse polarity, short circuit
  - Temperature protection
- Storage/refresh modes
- AC line interlocking
- Smart timer.
  - Automatically shuts down charger if charging cannot be completed.
- Sealed enclosure.
- Light weight and compact size.

## Specifications

AC Input Ratings	
Voltage	90-130/180-260 VAC
Max Current	9A @ 85V, 5A @ 170V
Frequency	50-60 Hz
Phase	Single-Phase
AC Input Tolerances	
Voltage	85-135/170-264 VAC
Frequency	47-63 Hz
DC Output Ratings	
Voltage	24V
Current	25A
AC Line Interlocking	-
Environmental	
Operating Temperature	-25 to 131 °F (-31 to 55 °C)
Storage Temperature	-40 to 185 °F (-40 to 85 °C)
Mechanical	
Dimensions (L x W x H)	8.35"x7"x5.25" (212mm x 179mm x 139mm)
Water Resistance	IP65



## **Installation & Safety**

### **Installation**

- A wire loop provides for selection of battery types: flooded (Wet) type (do not cut the wire loop), sealed (AGM, Dry) and gel type (cut the wire loop and tape the wire ends back with electricians tape).
- Battery Cable connection: Black output wire goes to battery negative terminal, Red output wire goes to battery positive terminal.
- AC interlock wire – should follow equipment manufacturer's instruction for correct connection method
- Fix the battery charger to a stable surface through the appropriate holes inserted on the fixing flanges.
- Preferably the charger should be installed horizontally – with the heat-sink facing to the side. The vertical installation (with the heat-sink facing up) is allowed. Never install in the vertical position with the heat-sink facing down.
- Ensure all heat sinks are not obstructed, to avoid the overheating. Do not put the battery charger near heat sources.
- Make sure that free space around the battery charger is sufficient to provide adequate ventilation and an easy access to cables sockets

### **Safety Instructions**

- Verify that the available supply voltage corresponds to the voltage that is stated on the battery charger name plate.
- To avoid damaging the power cord, do not put anything on it or place it where it will be walked on. If the cord becomes damaged or frayed, replace it immediately.
- Do not operate a charger that is not working correctly. An electric shock hazard or battery explosion hazard from overcharging may exist.
- Though the charger is resistant to water and spray washing. Do not wash the charger when it is hot. Do not fully immerse or spray wash for an extended time.
- Liquid can get inside charger and may cause serious injury or death.
- The charger is designed for use in industrial areas. It is not designed to be used in medical (hospital) environments where interference with life critical equipment could cause serious injury.
- This charger is intended only for use on industrial equipment and 24V lead acid batteries
- The charger surface can get hot while operating and contact with the skin or surrounding materials should be avoided.
- If you use an extension power cable with your charger, ensure the total current draw of the items plugged into the extension power cable do not exceed the current

## Installation & Safety - cont.

- rating of the extension cable and meet all national and local electrical code requirements.
- When attaching leads to battery terminals, be careful that tools do not short between battery terminals. Shorting between battery terminals may cause extreme arcing resulting in explosion or extreme heat that can cause burns.
- Do not touch battery terminals or any exposed electrical parts during charging or when power is on. Contact with battery terminals or other exposed electrical parts may cause an electric shock.



Do not operate charger if wiring is damaged. An electric shock could cause injury or death.



Ensure that the AC voltage supplied to the charger is within the ranges in the specification table. Voltages outside this range, particularly high voltages, can result in an electric shock and fire hazard and will fail the charger.



To reduce the risk of an electric shock, connect only to a properly grounded single-phase (3-wire) outlet.



Do not attempt to service the charger if you are not a trained service technician. The high voltages inside the charger are a shock hazard and can cause serious injury or death. The warranty is void if the charger case has been opened.



The charger contains chemicals cause birth defects or other reproductive harm. Wash hands thoroughly after handling.



There could be a spark during charging. Be careful when using fuels, solvents or other flammables near the charger or batteries. An explosion could result causing death or serious injury.

## Operation

**(1)** Make sure the yellow wire loop is prepared for the correct battery type. Flooded (wire loop not cut), sealed AGM and Gel (wire loop cut)

**(2)** Connect the charger AC cable into a single phase AC socket with a nominal voltage rating of 100V, 110V, 115V, 120V, 220V, 230V, or 240V and a frequency rating of 50 or 60Hz. The charger will start charging the batteries automatically within a few seconds.

**(3)** The four LEDs indicate the charging status.

- The yellow “AC” LED will light to show there is AC power to the charger.
- The green “DC” LED shows the battery is charging.
- The green “100%”: LED will light when the battery reaches 100%.
- Charging time is dependent on depth of battery discharge, battery AH rating, battery condition, and temperature. The battery can be disconnected after the 100% LED is on or left connected

**(4)** If you leave the charger plugged to the AC socket after charging is completed (100% LED on), the charger goes into maintenance mode to keep batteries fully charged while in storage.

**(5)** Disconnect the AC power cable to turn-off the charger.

### LED Table (in normal operation)

AC	DC	100%	BAD	CONDITION
YLW LED	GRN LED	GRN LED	RED LED	
Off	Off	Off	Off	No AC power to charger
On	On	Off	Off	Normal operation, charger is charging
On	On or Off	On	Off	Normal, battery is 100% charged and charger is in maintenance mode

## Maintenance



**WARNING:** Disconnect from AC voltage before doing any service. When plugged-in the AC wiring is an electric shock hazard. Disconnecting the DC output (connection to battery) near the batteries when the charger is ON may cause the batteries to explode resulting in serious injury or death.



**WARNING:** Risk of an electric shock causing serious injury or death. Do not touch un-insulated parts of the charger wires, battery connector or battery terminals. Be careful with tools as shock or arcing from shorting of electrical parts may cause serious injury or death. Remove rings, watches, and jewelry to avoid arcing and electric shock.

- 1) All electrical connections must be kept clean and tight. Sometimes connections can look good outside but be corroded inside causing an output connection error (DC LED will not light).
- 2) The charger cools through the case fins. If the fins become covered with debris the charger's over-temperature protection system may reduce charging power. Clean-off fins to improve cooling.
- 3) Replace the charger if case damage breaks the water-tight seal.
- 4) Inspect wiring weekly, including AC plug, AC cord, DC wires to battery connector, Battery connector, and interlock wires (if used) for cut insulation, pinching, or other damage. Repair to avoid electric shock.
- 5) Follow battery supplier recommendations for battery care and maintenance.

## Troubleshooting



**WARNING:** Do not disassemble the charger. High voltages inside the charger are an electric shock hazard and may result in serious injury or death.



**WARNING:** Do not operate the charger if it is malfunctioning. Personal injury or property damage could result. Electric shock hazard may cause serious injury or death.



### LED Table for Troubleshooting

	LED				
	Yellow	Green #1	Green #2	Red	Status
Case 1	OFF	OFF	OFF	OFF	Normal
	<b>Condition:</b> AC Power is not connected to the charger.				
Case 2	ON	ON	OFF	OFF	Normal
	<b>Condition:</b> AC power on, charging in process.				
Case 3	ON	ON/OFF	ON	OFF	Normal
	<b>Condition:</b> Charging is complete, charger is in maintenance mode.				
Case 4	OFF	OFF	OFF	OFF	Not Normal
	<b>Possible cause:</b>				
	AC power is connected to the charger but measured no AC voltage.				
	<b>Trouble shooting steps:</b>				
	<b>STEP 1:</b> Measure input AC voltage, the correct voltage ranges are: 85V-				
Case 5	ON	OFF	OFF	OFF	Not Normal
	<b>Possible cause:</b>				
	AC power is on, but the charger is not charging. Reason? - the charger may not get the correct voltage from the battery.				
	<b>Trouble shooting steps:</b>				
	<b>STEP 1:</b> Check to see if the battery pack is a 24V pack. If no, change to				
Case 6	ON	OFF	OFF	Blink Once in every 8 seconds	Not Normal
	<b>Possible cause:</b>				
	Charger is not charging. Reason? - battery voltage may be too high.				
	<b>Trouble shooting steps:</b>				
	<b>STEP 1:</b> Check to see if battery pack is a 24V pack.				

## Troubleshooting - cont.

Case 7	ON	OFF	OFF	Blink twice in every	Not Normal
	Possible cause:				
	Charger is not charging. Reason? - wrong battery pack or over-				
	Trouble shooting steps:				
	STEP 1: Check to see if battery pack is a 24V pack.				
	STEP 2: Check to see if the battery voltage is higher than 21.6V. If the voltage is lower than 21.6V, the batteries might have been overly				
Case 8	ON	ON	OFF	Blink twice in every 8 seconds	Not Normal
	Possible cause:				
	Charging is timed out (in 24 hours) . There could be several reasons:				
	Trouble shooting steps:				
	STEP 1: Check if the batteries are weared off, or damaged.				
	STEP 2: Was there a load on the battery during the charging process. If				
Case 9	ON	ON	ON	Blink Once in every second	Not Normal
	Possible cause:				
	Batteries charged to 100% too quickly. Reason? - the batteries were almost full prior charging, or the batteries are bad.				
	Trouble shooting steps:				
	STEP 1: If the battery pack was almost full, before charging, the charger				
	STEP 2: If the batteries are bad, change batteries.				
Case 10	ON	Blinking	OFF	OFF	Not Normal
	Possible cause:				
	The voltage of the electrical network is not in the correct voltage ranges				
	Trouble shooting steps:				
STEP 1: Check to make sure the charger is connected to the correct					



**CAUTION:** If the AC plug or receptacle is broken, twisted, bent or loose, it cannot make a good electrical connection and an electric shock hazard may exist. Have it repaired or replaced by a qualified person immediately. **DO NOT USE THE CHARGER UNDER THIS CONDITION.** Fire, injury, or death may result if not corrected.

## Troubleshooting - cont.

### **BATTERIES DO NOT FULLY CHARGE**

If the batteries are charged overnight, make sure the AC supply is not being switched-off at night with other building items.

### **NEW BATTERIES**

If batteries are new they sometimes need 20 to 30 charge/discharge cycles before they charge normally due to a process called plate formation. With new batteries the 100% LED may not light after a normal overnight charge. The batteries and charger are fine – the machine should be used and charged each night. Within a few days to a week the 100% LED will go on during a normal overnight charge.

Brand new batteries are more easily damaged by heavy discharge than batteries that are older. Try to avoid heavy discharge when new batteries are installed for at least the first 20 charge cycles.

### **OLD BATTERIES**

If batteries are old, check the battery condition following the battery supplier's instructions. Check for dead cells or Weak cells. If the charger case gets warm after several hours of charging, the charger is probably good and the batteries bad.

## Uninstalling the Charger



**WARNING:** Disconnect from AC voltage before doing any service. When plugged-in the AC wiring is an electric shock hazard. Disconnecting the DC output connector near the batteries when the charger is ON may cause arcing and the batteries to explode resulting in serious injury or death.



**WARNING:** Risk of an electric shock causing serious injury or death. Do not touch un-insulated parts of the charger wires, battery connector or battery terminals. Be careful with tools as shock or arcing from shorting of electrical parts can cause serious injury or death. Remove rings, watches, and jewelry to avoid arcing and electric shock.



**WARNING:** Do not disassemble the charger. Take it to a factory-authorized service agent when service or repair is required. High voltages inside the charger are an electric shock hazard and can result in serious injury or death.